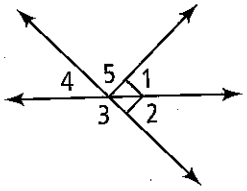
Practice and Problem-Solving Exercises

MATHEMATICAL PRACTICES

A Practice

Use the diagram at the right. Is each statement true? Explain.



7. $\angle 1$ and $\angle 5$ are adjacent angles.

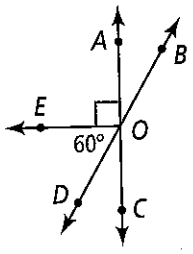
8. $\angle 3$ and $\angle 5$ are vertical angles.

9. $\angle 3$ and $\angle 4$ are complementary.

10. $\angle 1$ and $\angle 2$ are supplementary.

See Problem 1.

Name an angle or angles in the diagram described by each of the following.



11. supplementary to $\angle AOD$

12. adjacent and congruent to $\angle AOE$

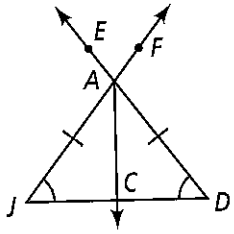
13. supplementary to $\angle EOA$

14. complementary to $\angle EOD$

15. a pair of vertical angles

See Problem 2.

For Exercises 16–23, can you make each conclusion from the information in the diagram? Explain.



16. $\angle J \cong \angle D$

17. $\angle JAC \cong \angle DAC$

18. $m\angle JCA = m\angle DCA$

19. $m\angle JCA + m\angle ACD = 180$

20. $\overline{AJ} \cong \overline{AD}$

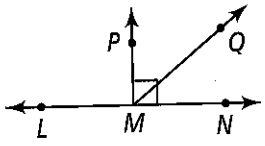
21. C is the midpoint of $\overline{JD}$.

22. $\angle JAE$ and $\angle EAF$ are adjacent and supplementary.

23. $\angle EAF$ and $\angle JAD$ are vertical angles.

See Problem 3.

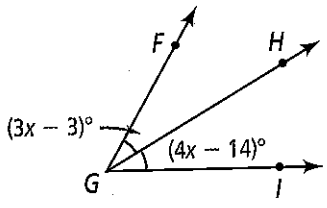
24. Name two pairs of angles that form a linear pair in the diagram at the right.



25. $\angle EFG$ and $\angle GFH$ are a linear pair, $m\angle EFG = 2n + 21$, and $m\angle GFH = 4n + 15$. What are $m\angle EFG$ and $m\angle GFH$?

See Problem 4.

26. Algebra In the diagram, $\overrightarrow{GH}$ bisects $\angle FGI$.



a. Solve for x and find $m\angle FGH$.

b. Find $m\angle HGI$.

c. Find $m\angle FGI$.

Algebra $\overrightarrow{BD}$ **bisects** $\angle ABC$. **Solve for** x **and find** $m\angle ABC$.

27. $m\angle ABD = 5x,\ m\angle DBC = 3x + 10$

28. $m\angle ABC = 4x - 12,\ m\angle ABD = 24$

29. $m\angle ABD = 4x - 16,\ m\angle CBD = 2x + 6$

30. $m\angle ABD = 3x + 20,\ m\angle CBD = 6x - 16$

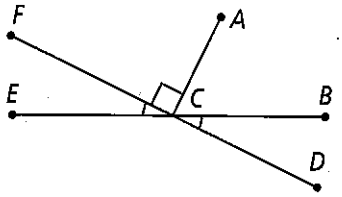
Algebra Find the measure of each angle in the angle pair described.

31. Think About a Plan The measure of one angle is twice the measure of its supplement.

- How many angles are there? What is their relationship?
- How can you use algebra, such as using the variable x, to help you?

32. The measure of one angle is 20 less than the measure of its complement.

In the diagram at the right, $m\angle ACB = 65$. **Find each of the following.**



33. $m\angle ACD$

34. $m\angle BCD$

35. $m\angle ECD$

36. $m\angle ACE$

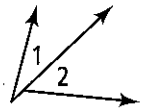
37. Algebra $\angle RQS$ and $\angle TQS$ are a linear pair where $m\angle RQS = 2x + 4$ and $m\angle TQS = 6x + 20$.

a. Solve for x.

b. Find $m\angle RQS$ and $m\angle TQS$.

c. Show how you can check your answer.

38. Writing In the diagram at the right, are $\angle 1$ and $\angle 2$ adjacent? Justify your reasoning.



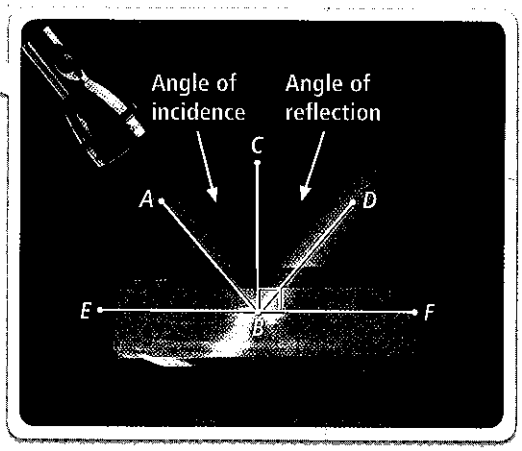
39. Reasoning When $\overrightarrow{BX}$ bisects $\angle ABC$, $\angle ABX \cong \angle CBX$. One student claims there is always a related equation $m\angle ABX = \frac{1}{2}m\angle ABC$. Another student claims the related equation is $2m\angle ABX = m\angle ABC$. Who is correct? Explain.

STEM 40. Optics A beam of light and a mirror can be used to study the behavior of light. Light that strikes the mirror is reflected so that the angle of reflection and the angle of incidence are congruent. In the diagram, $\angle ABC$ has a measure of 41.

a. Name the angle of reflection and find its measure.

b. Find $m\angle ABD$.

c. Find $m\angle ABE$ and $m\angle DBF$.



41. Reasoning Describe all situations where vertical angles are also supplementary.